

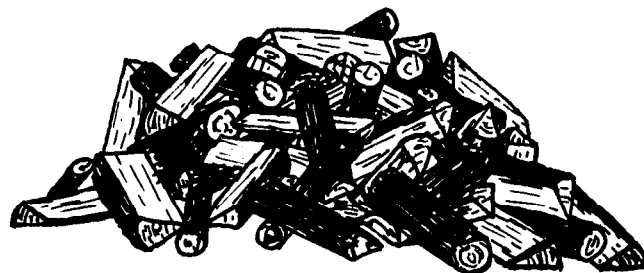
# Timber Stand Improvement for Woodland Owners

...A guide for improving your woodlot by cutting firewood.



By Bruce Palmer  
Resource Forester  
Neosho

Drawings by  
Steve Gum



Around the turn of the century, wood provided 75 percent of the fuel and heating needs of the United States. Our forefathers searched for good woodlands when settling new frontiers. They recognized that the woods provided a renewable source of fuel for heating and cooking as well as building materials for new homes and businesses.

As use of the more convenient fossil fuels increased over the past 50 years, the use of wood decreased accordingly. In recent years, however, with the petroleum shortages and price deregulations, wood is coming back into its own as a source of fuel.

The use of wood as fuel in Missouri presents some interesting opportunities for consumers and landowners alike. Wood can be used as an energy source to provide some relief from the high costs of other fuels. A great majority of the firewood in Missouri comes from private land. Cutting trees for firewood gives us an opportunity to help correct some of the past mistakes in forest use.

In the past, much of Missouri's woodlands were overcut, burned, grazed and generally mismanaged. These practices resulted in stands of undesirable trees—crooked, diseased or otherwise unmarketable. These trees hamper the growth of the straight, healthy trees that will produce quality lumber and veneer.

A good first step in getting a woodlot in shape is cutting the undesirable trees for fuel. This pamphlet is not intended to be strictly a guide in fuelwood forestry, but rather how to cut wood for heating and also produce quality wood products, wildlife habitat and other benefits from a well-managed woodlot.

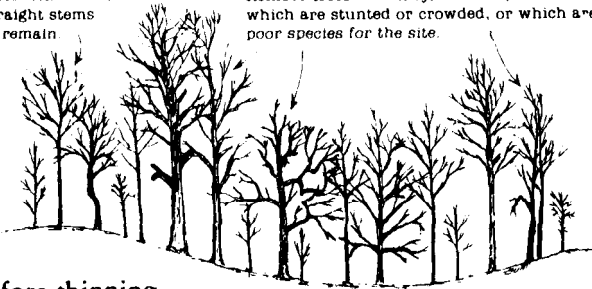
## Why TSI?

The purpose of timber stand improvement (TSI) is to free desirable trees from competition, thin the trees to desirable numbers and remove the poorer trees. This improves the overall condition of the stand, and the wood growth is concentrated on a number of selected trees.

## EXAMINE TREES BEFORE FUELWOOD CUTTING TO IMPROVE THE TIMBER STAND

Allow healthy trees with clean, straight stems to remain

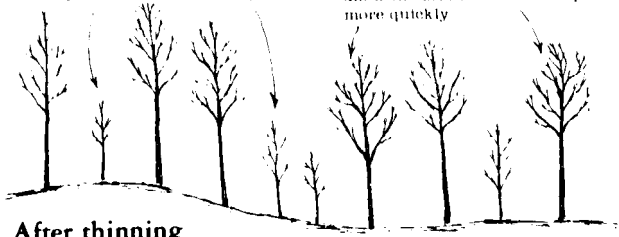
Remove trees with major defects, those which are stunted or crowded, or which are poor species for the site.



**Before thinning**

Young, vigorous trees will grow into openings

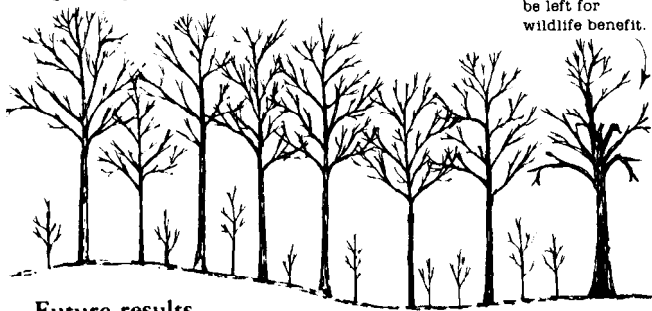
A properly thinned stand will allow the best trees to develop more quickly



**After thinning**

Trees with greater value are produced in the shortest time in a managed stand. Harvest and regrowth are part of management cycle

Some older, hollow trees may be left for wildlife benefit.



**Future results**

Timber is like any other agricultural crop--it needs care during its lifetime to produce a high-quality product and to give the landowner the highest financial return. A farmer wouldn't consider planting a crop of corn or soybeans and not going back into the field until harvest time. The same principle applies to timber--it needs some cultivation to produce a good harvest.

When a stand of trees is very young, there may be 4,000 or 5,000 seedlings growing on a single acre. This same stand will have fewer than 100 trees remaining when it is mature and ready to harvest. Nature will thin out the surplus trees, but this unaided natural process may take the stand 150 to 200 years to reach marketable size. Periodic thinning can improve tree quality and reduce the time span to less than 100 years.

A stand of trees that averages 4 to 10 inches in diameter at breast height (4 1/2 feet from the ground) is a prime candidate for thinning since this size tree responds rapidly after thinning. This does not mean that stands averaging more than 12 inches in diameter cannot be

thinned, but these trees do not respond as quickly after thinning as the smaller trees. The larger trees are approaching commercial size, and care should be taken not to cut trees for firewood that will produce quality saw logs.

There are several benefits to thinning the larger-sized stands. First, the cull trees and undesirable species can be cut for firewood. Cull trees are those which are not marketable now for anything except firewood and which are not expected to become marketable in the future. Second, after thinning, the remaining trees usually increase nut or seed production. This provides food for wildlife as well as a seed source for the next generation of trees.

### Tree Selection

The two main factors that limit tree growth in Missouri are sunlight and moisture. The competition among trees for sunlight in the crowns is readily visible and uncomplicated. The corresponding competition for moisture and growing space in the soil is much more complex and difficult to observe. For this reason, crown competition and several other factors to be discussed later will be used to determine which trees to cut for firewood and which ones to leave.

The easiest way to get started is to walk through the woods and observe the form, condition and size of the different trees. At first, everything may look the same, but after a time, certain characteristics should be obvious. The trees of the stand can be placed in three categories.

The first and most important group are the trees which will be the final crop. These should be of desirable species and have tall, straight, clear trunks free from insect or disease damage, fire scars, decay or mechanical damage. The crop tree should have a full, healthy crown with no large dead branches. The crowns should be at the general level of the crown cover or extend above it and receive full sunlight. Once the crown of a tree has been reduced in size by its competitors, it cannot always be restored to a dominant position by thinning. Therefore, it is better to encourage the dominant trees rather than try to revive those that have fallen behind.

The second group comprises those trees which will be removed in future firewood thinnings but which will be needed in the meantime to utilize growing space. It is important to maintain the proper number of trees on a given acre in order to fully utilize the growing space. If there are too many trees, they will be crowded and cannot realize their full growth potential. On the other hand, if all but the crop trees are removed in one thinning, the land is not producing all the wood of which it is capable. The quality of the remaining trees will also decline due to less height growth, persistent lower limbs and wind damage.

The final category comprises the surplus trees that are to be removed in the first thinning. These trees are the least desirable in the stand because of species or form. These should be cut for firewood as soon as possible. The characteristics which make the trees in the second and third categories undesirable as crop trees are:

- undesirable species;
- multiple sprouts from one stump;

- low-forked or crooked;
- swellings or bumps on the trunk which indicate internal damage;
- fire scars or other damage to the trunk; or
- cull trees or wide-spreading trees with excessive limbs

When selecting the species to leave, remember that individual species will grow on the sites best suited for them. Some species naturally have a higher commercial value than others, and these are the ones to favor when faced with the choice between two species. Several of the more valuable species in Missouri are black walnut, white oak, black oak, red oak, ash, silver maple, pine, yellow-poplar and sweetgum. Some species usually considered non-commercial as saw logs are honey locust, blackjack oak, Osage orange and American elm. It is necessary to work with the species available, but any species will be of higher quality if it has had some care rather than being left to fend for itself.

Spacing between the crowns probably is the easiest and most obvious way to determine the competition for growing space. One general rule of thumb for spacing is to leave 5 to 8 feet of open space on at least two sides of the crown of the remaining trees. This will give the remaining trees enough additional sunlight to maintain good growth rates.

If the stand is relatively uniform in diameter, the "diameter-times-two" rule can be used. With this method, the average diameter in inches is multiplied by two; this is the number of feet to leave between the stems of the remaining trees. For example, if the stand averages 5 inches in diameter, the spacing between the trees should average 10 feet.

Since trees do not grow in even spacing, it is impossible to adhere strictly to either of these rules. Two good trees may be left with their crowns touching. If they have open space on two other sides, they will have enough growing room. In some crowded stands, it may be necessary to remove the defective trees plus some good trees in order to maintain proper spacing. Aim for the averages; this will ensure proper spacing to fully utilize the site.

The two spacing rules thin the tree crowns in the main canopy rather than the understory. The understory trees are already deprived of sunlight and removing them will not have much effect on the main stand. Those trees which are large enough may be cut for firewood. Many times, the vegetation in the understory is referred to as "brush," and efforts are made to eliminate it. A closer look may reveal that the "brush" is actually small saplings of desirable tree species. These saplings are the next generation of trees, waiting for a larger tree to die or be removed to give them the sunlight and room they need to grow into the canopy.

### Multiple Stems

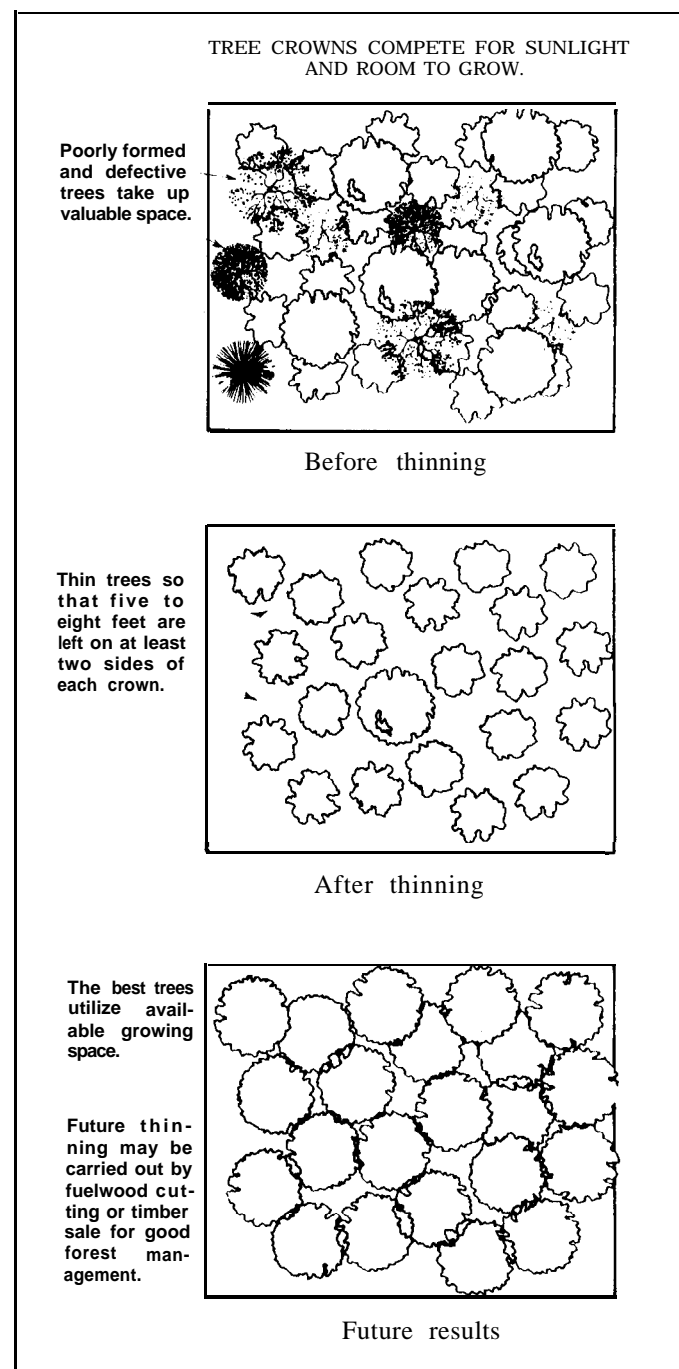
Trees with multiple stems are common in Missouri's forests. Most hardwood species sprout readily from the stump following cutting or fire. These multiple-stem trees can develop into quality single-stem trees if they are treated early enough. Multiple sprouts are best treated when they are less than 20 years old or 3 inches in diameter at breast height. When treated at this size, the selection of the best sprout is easy, and the wounds from

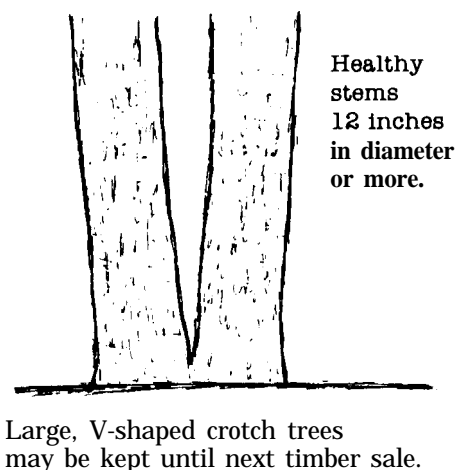
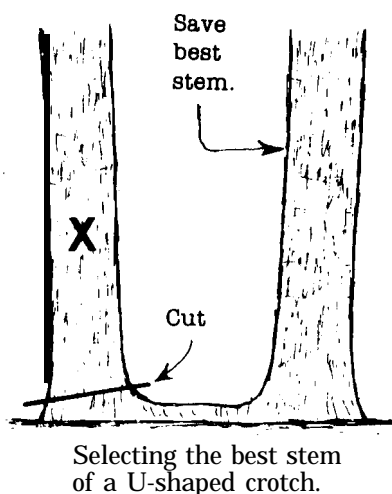
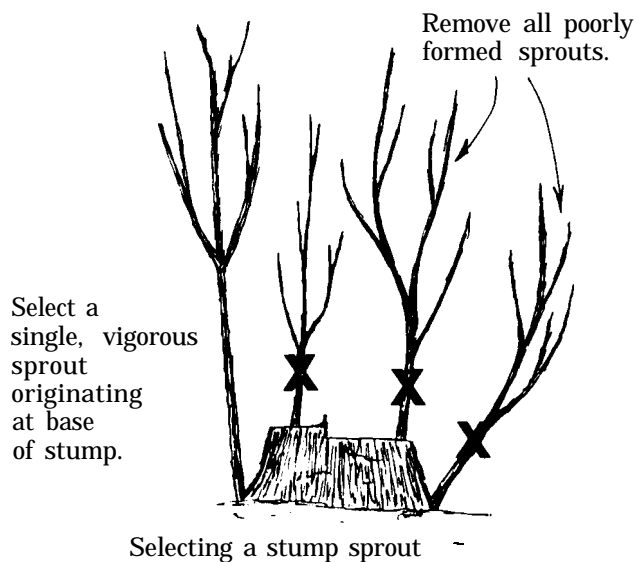
removing the extra sprouts heal quickly.

On small sprouts originating from a large stump, select a low sprout and cut off all the others. A sprout arising low on the stump is less likely to decay from the wound left when the parent stump rots.

Multiple sprouts that are joined at the base with a V-shaped crotch are more of a problem to deal with. It is difficult to remove one stem without leaving a large wound through which decay will develop in the remaining stem. In this situation, it is better to remove the entire clump and encourage the development of a nearby single-stem tree.

Sprouts with a low U-shaped crotch (wide enough to place your foot between the stems) are easy to correct. For any diameter sprout, pick the best one and cut the





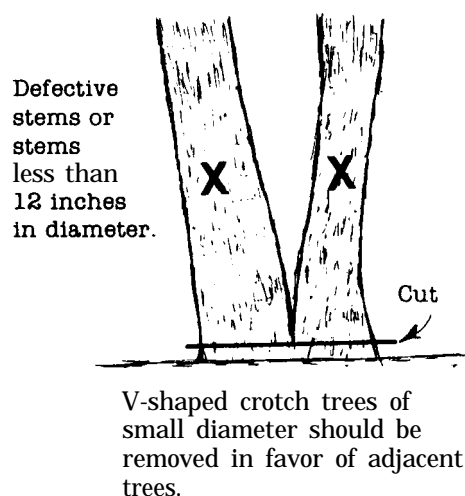
others off at a convenient height. A double-stem tree that is larger than 12 inches in diameter is approaching commercial saw log size. It is best to leave the tree if it is of good form and to harvest it during the next commercial timber sale.

To prevent sprouting from the stumps left after cutting firewood, treat with a woody-plant herbicide. Since many of the trees removed for firewood are undesirable, the sprouts from their stumps will not be wanted in the future timber stand. Some of the available herbicides and their common trade names are 2,4-D, picloram (Tordon 101R), dicamba (Banvel), and triclopyr (Garlon). The herbicide should be applied to the stump immediately after the tree is cut. If several days pass before the chemical is applied, the conductive tissues in the stump will have sealed over. The herbicide will not be absorbed into the stump and will be ineffective. As with any chemical, herbicides should be used safely and only according to label directions.

### Other Management Considerations

Landowners with large acreages of timber may be overwhelmed by the thought of thinning all their woods in one winter. But there is no reason to thin the entire area at one time. Most experts agree that for best timber production, a stand should be thinned every 10 years or so. By dividing a wood lot into 10 or more units and thinning one unit each year, the job is not so large, and a continuous supply of firewood is also assured. When the thinning in the last unit is finished, it will be time to start on the first unit again.

Managing a wood lot can produce firewood and other wood products, but a well-managed forest will also complement a number of other forest uses. The forest provides food and cover for wildlife. Deer, turkeys and squirrels make the woods their home, as do many songbirds and non-game animals. A few simple practices can make a wood lot more attractive to wildlife.



## TREATMENT OF MULTIPLE STEMS OR TRUNKS.

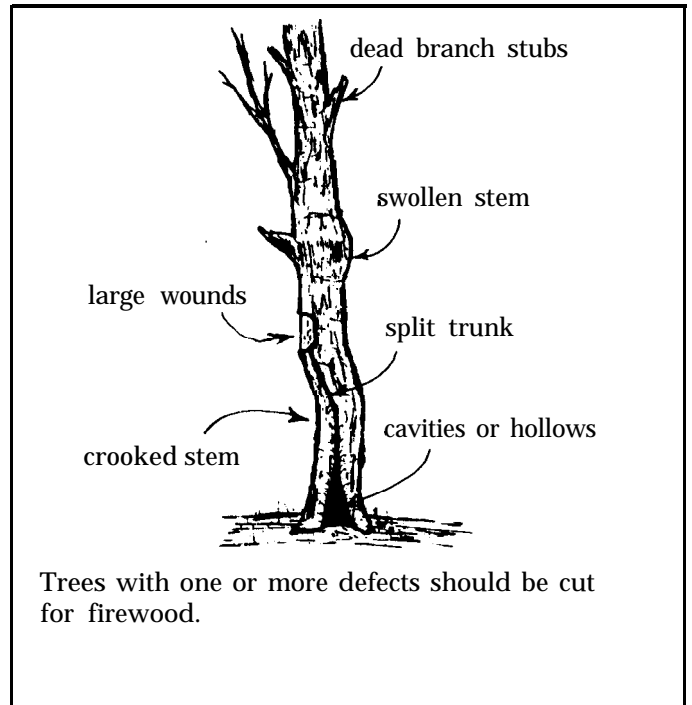
Trees with hollows in the trunk or upper limbs provide homes for several species. Leaving one or two hollow trees per acre encourages squirrels and raccoons. Several dead, standing trees can also be left on each acre. These dead trees do not take up any growing room, and they provide habitat for cavity-nesting birds like woodpeckers and bluebirds. When harvesting saw logs, leave several large oaks, hickories or walnuts scattered throughout the area to ensure a continued food source for wildlife.

Many times after a thinning, briars and other vegetation appear in the understory. This provides browse for deer and food and cover for many other species of birds and animals. Eventually, the understory will be shaded out as the tree crowns start to close.

By allowing flowering trees to remain, the woods can be a more attractive place. Dogwood, redbud, blackhaw, serviceberry and hawthorn are all understory trees and do not compete with the main stand for light. The fruits of these trees also are a valuable source of food for wildlife.

Watershed values are also enhanced by a forested watershed. The soil of a well-managed forest is able to absorb most of the precipitation that falls on it, which reduces soil erosion and helps replenish the groundwater and stabilize the flow of springs. Streams flowing from forested watersheds are clearer and higher in quality than streams in non-forested watersheds.

Another important consideration is that thinned wood lots are healthier than unthinned stands. Because thinned stands have more moisture and growing room available, the vigorously growing individual trees are better able to withstand stresses caused by insects, disease and drought.



Obviously a pamphlet of this length cannot cover every possible situation. The methods described are sound forest-management practices and should get you started in the right direction toward improving your wood lot. If you have specific problems or need help in marketing your timber, contact your district forester of the Missouri Department of Conservation or State Forester, Box 180, Jefferson City, MO 65102.

